



MEASURING GOOD RESEARCH MANAGEMENT

C. W. (Clem) Bowman is a Canadian technology consultant based in Sarnia, Ontario. He has been involved in many international technology endeavors, and chaired the Heavy Oil and Tar Sands Advisory Committee for the United Nations Institute for Training and Research during its first year of operation. Bowman was most recently president of the Alberta Research Council, with the mandate to advance the economy of the province through technology development. Prior to this appointment he was vice president, research for Esso Petroleum Canada, with responsibility for the Esso Research Center, Sarnia, Ontario. He is past chairman of the Canadian Research Management Association, and holds a Ph.D. in chemical engineering from the University of Toronto.

Most research managers begin their careers as practicing scientists or engineers and gradually assume management responsibilities over an extended period of time. How should they measure their progress in management effectiveness? Feedback from their superiors, and even more importantly, feedback from paying clients, will always be the major guide to effectiveness. It would be useful, however, to have an additional framework against which progress can be measured, a framework that looks at the fundamental elements of good research management.

The matrix shown below is a guide to

assessing the progress of a research manager, and also the effectiveness of his/her entire research organization.

It can be made quantitative by setting the maximum score for effectiveness in each element at 10, giving the highest possible score of 90. At the early stages of a career, contribution would likely be restricted to only one or two of the elements. Scores would be, therefore, relatively low; even though contributions in specific elements could be high. As careers develop, opportunities for contribution would encompass more elements.

Research Management Assessment Matrix

	Do Now	Do Soon	Do Sometime
Inside R&D	<p><i>Set Inspiring R&D Goals</i></p> <ul style="list-style-type: none"> • Vision statement. • Mission statement. • Staff commitment. 	<p><i>Make the Technical Ladder Work</i></p> <ul style="list-style-type: none"> • Avoid salary compression. • Reward high performers. • Appoint technical staff as corporate advisors. 	<p><i>Expand Training and Retraining</i></p> <ul style="list-style-type: none"> • Establish training budget. • Broaden staff experience base. • Have staff involved in training decisions.
Inside the Corporation	<p><i>Get Technology into the Corporate Plan</i></p> <ul style="list-style-type: none"> • Help establish corporate objectives. • Imbed the technology plan. 	<p><i>Develop Corporate Cross-Links</i></p> <ul style="list-style-type: none"> • Interact with business. • Lend staff to other functions. 	<p><i>Ensure Continuity of Support</i></p> <ul style="list-style-type: none"> • Develop and communicate measures of accountability. • Sell R&D as an investment. • Avoid staffing swings.
External	<p><i>Establish National and International Technology Linkages</i></p> <ul style="list-style-type: none"> • Identify strategic linkages. • Develop joint ventures. • Exchange personnel. 	<p><i>Get the Message to Schools</i></p> <ul style="list-style-type: none"> • Hire teachers in the summer. • Help provide science teaching modules. • Rent a school. 	<p><i>Link with Community Leaders</i></p> <ul style="list-style-type: none"> • Promote the "city state." • Link with small business. • Help develop consensus on environmental issues.

EXHIBIT C

What's Your Problem?

Ever had one? And solved it? Or simply found a technique for managing your R&D a little more effectively?

Then please tell us what you've done—in 500 words or less. We'll print as many as space permits.

Send replies (typewritten) to
The Editor,
*Research • Technology
Management*, 11th floor, 1550
M St., N.W., Washington, DC
20005.

The left-hand column identifies three arenas for action—inside the R&D organization, inside the corporation (major clients or government departments would serve as a surrogate for the corporation for some research entities), and external to the corporation. The top row sets out three time frames: now, soon and sometime. This is somewhat arbitrary, but it is an attempt to portray the urgency of the issues. Omitting the top row and the left column, it is a three-by-three matrix, with the usual element designations of A1 in the upper-left corner and C3 in the lower-right corner.

This matrix looks at the input parameters for good research management. If these are handled well, the output parameters, such as research findings and technology transferred and used, will also be high.

Cell A1—Set Inspiring R&D Goals

One of the most important tasks is to ensure that the R&D organization has clear and inspiring research goals. Unless staff have a vision of the organization's purpose and direction, it will be extremely difficult to rise above a fire-fighting mode, meeting only the immediate needs of the organization.

Both vision and mission statements are needed; these are separate and integral components of an organization's purpose and direction.

The mission states what business the organization is in. The vision states what the organization aspires to become within that business. It is imperative that staff be actively involved in developing these statements.

Cell A2—Make the Technical Ladder Work

It is essential that the technical ladder really work, and that it not be regarded as a second-tier career path. It is interesting to me that in the five research organizations in which I have worked, the staff who are remembered are the ones who have created major technology advances. Management personnel are soon forgotten. The waters close over very quickly.

There are many things research managers should be doing to enhance and improve the technical ladder, including avoiding salary compression at the top, rewarding the high technology performers, and giving the technical staff a real stake in developing the technology agenda of the corporation.

Cell A3—Expand Training and Retraining

The most damaging thing management can do is to typecast an employee and keep him repeating his Ph.D. thesis for the rest of his career. Some may want to do that, and to make deep holes in the frontier of knowledge. But most people want to grow in breadth as well as depth. Research managers should ensure that an appropriate training component is included in the career plans of all staff. The following questions can be raised: Is there a specific training budget? Are there consistent training policies and practices? Do employees participate in making training decisions?

Cell B1—Get Technology into the Corporate Plan

Why do so many young people choose careers in law and business over technical careers? One reason is the open-ended nature of these professions. There are no perceived impediments preventing lawyers from reaching the top of the corporate ladder. R&D does not have the same image; R&D is not seen as a route to

the top. A large part of the problem is the lack of connectivity between the corporation's agenda and that of the R&D organization.

R&D managers should get involved in setting corporate objectives. The company almost certainly has a long-term strategic plan. Does the research organization have a long-term technology plan? Is the technology plan imbedded in the corporation's plan? If it is not, then a major failing in both plans:

Cell B2—Develop Cross-Links

It is important for R&D staff to interact with their business counterparts. Research staff should be represented on company business development teams. Without this connectivity, R&D will become disconnected from the affairs of the company, and already-disconnected R&D will soon become even more disconnected!

A significant percentage of staff should be on loan to marketing, operations, and corporate management. This goal can be quantified.

Cell B3—Ensure Continuity of Support

Lack of continuity in corporate support and funding can be the single most demotivating factor in an R&D organization. It is essential that corporations recognize that R&D is an investment, not an expense. Although it is easy to understand that a building represents an investment, it is difficult to make the case that developing or acquiring a strong technological base is also an investment. It is up to R&D managers to make that case. Companies are prepared to set aside money covering the depreciation of fixed assets. Why is it so hard to understand that equivalent amounts must be earmarked to maintain a corporate intellectual assets?

An effective R&D organization can be maintained without continuity of corporate support and funding. Without this continuity, periodic downsizing and upsizing will certainly occur, followed by, as some R&D organizations have found, capsizing.

The hunt for new business opportunities will easily justify large and rapid increases in staff. A sudden downturn in a business makes it equally easy to cut staff in a dramatic fashion. As long as management sees human resources as a physical or operating asset, to be purchased and used on an as-needed basis, loyalty and commitment will be hard to establish. Fortunately, many companies are able to manage their human resources for the long term, without pink slips, without black Fridays.

Cell C1—Establish National and International Linkages

An individual company develops only a very small percentage of the world's pool of technology. The acquisition of externally developed technology is an extremely difficult task. The most successful technology transfer occurs through people. Research organizations are great international bridge-builders. Language becomes less of a barrier. Research managers should identify the international connections needed to supply the corporation's technology needs. Memoranda of understanding are easy ways to get material, ideas and people flowing across the bridge. These will lead to joint technology agreements and to productive business arrangements. The exchange of scientific personnel is an excellent way to get the process started.

Cell C2—Get the Message To Schools

The school system represents a highly concentrated contact with the public, a true captive audience! Unfortunately, it is still a mass audience, and it would take an enormous amount of effort to reach individual students. But there is a neat leverage approach we can use,

and that is the teacher. The contact ratio goes up to about 25-to-1.

Hire teachers to work in your research department in the summer. They have time. They like the money, and it gives them an insider's view of research. Make sure that they have a well-defined project. Require them to give a presentation at the end of the work period, followed by a second presentation to the local teachers' association. Help them develop a teaching module describing their project to take back to the classroom. This technique is direct, easy to administer, and has a quick payoff.

There are many other ways for research organizations to get into the school system: rent a school, career days, open houses, etc. They are all worth considering.

Cell C3—Link with Community Leaders

Many people believe that the city-state is making a comeback, that economic power is shifting to urban power blocs. Expanded cities are serving as the core for regional economic specialization. Not all our research organizations will be able to participate in this movement, but the public research institutes can provide some of the human resources needed to catalyze this process. They can serve on regional planning commissions. They can provide a training ground for entrepreneurs who lack some of the necessary technological and business skills.

Research managers should make an effort to understand and contribute to the aspirations of the communities in which they live. This improves understanding on both sides, and has been shown to be an effective way to develop a consensus on issues of

Research managers should make an effort to understand and contribute to the aspirations of the communities in which they live.

public concern, such as the environment.

Using the Matrix

The matrix illustrates how research managers can help meet the challenges of the 90s. They can do this by convincing their staff that R&D is a great career with unlimited opportunities, by helping to incorporate technology into the corporate plan, and by developing effective external business linkages. How should an R&D organization use this chart to assess its performance in research management? A useful exercise would be to start with an empty matrix, with only the top row (time) and the left-hand column (arenas for action) specified. The staff, in a workshop setting, can then define the key elements for success and propose the subordinate action elements. In this way, the matrix becomes tailor-made for the situation and the challenges facing the research organization.

Regardless of the approach, effective technology management has become a principal weapon in meeting global competition. Research managers must ensure that their organization has the management practices in place to give their corporation the needed technology edge. ☐